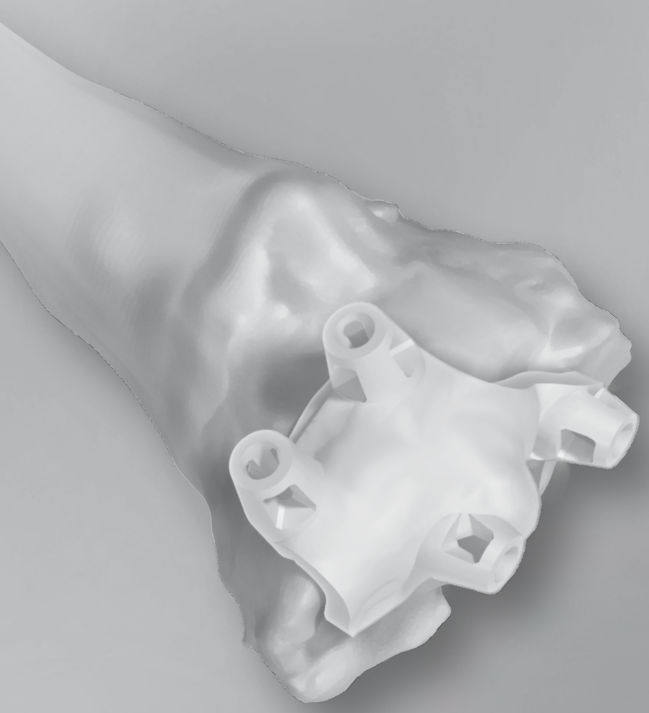
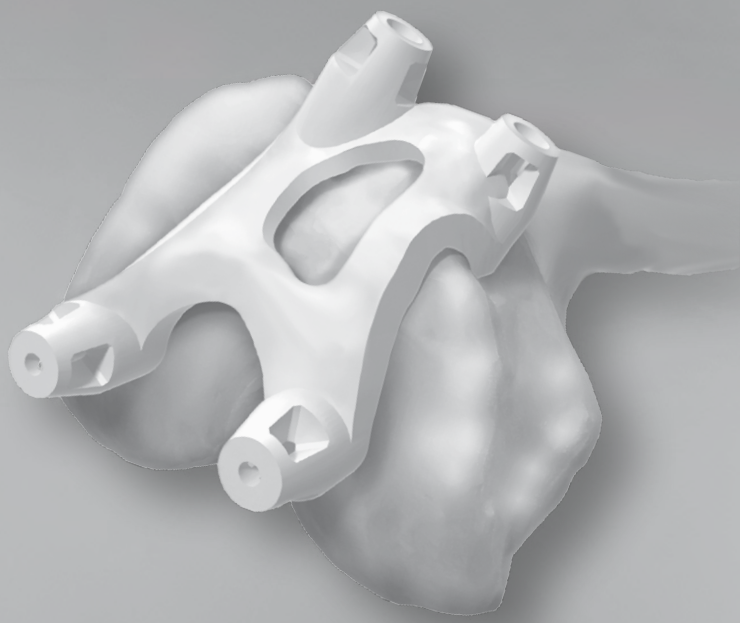
Patient-matched positioning guides in total knee arthroplasty



Chapter 9

Valorisation



This thesis primarily describes the results of one patient-matched positioning guides (PMPG) system in total knee arthroplasty. PMPG uses patient-specific guides to make bony resections of femur and tibia. Imaging techniques and a specific software program are used to create virtual models of the patient's femur and tibia. The virtual models are then used to identify anatomical landmarks of the knee which are used to calculate ideal implant size and positioning. The final step is to create alignment guides that have only one fitting position on the patient's individual femoral and tibial anatomy. They dictate bony resections in the preparation for prosthesis placement.

Main subjects of investigation were: alignment and clinical outcome obtained with this technique, safety and potential of the technique to adequately predict implant size. We compared PMPG to conventional instruments and concluded that they performed equally well with respect to obtaining a correct alignment, clinical outcomes, length of hospital stay and safety. A small reduction in blood loss and operation time was observed. Based on our observations, there is nothing against continued use of PMPG for performing a TKA. Import remaining issue is that of the cost-benefit of PMPG, compared to conventional instruments. This was not studied in detail in this thesis. We briefly investigated the potential of PMPG to adequately predict implant size preoperatively and found reasonable accuracy in this respect. These sizing capabilities of PMPG are essential to bring the 'knee in a box' philosophy a step closer, meaning the in time delivery of adequately sized prosthesis components and resection guides for every single TKA patient. This, in turn, is essential to reduce hospital prosthesis stock and to obtain significant cost reduction. Currently, high quality studies investigating in detail the exact potential of the technique to obtain this goal are lacking. Future research will therefore be necessary to address this issue in detail.

Our results are important, primarily for patients and their treating physicians, although they also serve for orthopaedic companies to improve the concept of PMPG. Furthermore, our results could be important to health insurance companies for determining their compensation policies. The issues discussed in this thesis will hopefully enable orthopaedic surgeons to make an informed decision as to whether or not to start using PMPG and when they choose to do so, what type of pitfalls are associated with their use. In any case, adequate surgeon training seems mandatory before starting to use PMPG. If PMPG would be implemented on a larger scale, this would impose some challenges as well. More specifically, the practise of training of orthopaedic surgeons will likely have to be altered. In this respect, it remains important for trainees to master the technique of conventionally instrumented TKA. This ensures that surgeons can always fall back on traditional instruments when e.g. guides are not sterile/drop down on the theatre floor, performing revision surgery, guides to not fit adequately etc.

We used questionnaires (patient reported outcome measures, PROM's) to study the clinical outcome of PMPG. When analysing these clinical results, we discussed the limitations of such questionnaires. As the proportion of younger, more active and more demanding patients undergoing TKA is rising, function after TKA is becoming more im-

portant. A search for PROM's allowing for greater differentiation of level of function between patients in assessing performance after TKA or total hip arthroplasty seems mandatory in order to appreciate subtle variations in function.

When analysing limb alignment after TKA, long-leg radiographs (LLR) are frequently used in daily practise. Although used on a large scale, the reliability and validity of measurements performed on these LLR was still debated. We concluded in this thesis that LLR show moderate to good reliability and, when compared to 3D CT-scan, show good validity. Therefore, no objections exist to continue their use in clinical practise.